

### **REMARKS**

Claims 1 through 20 are pending in this application. Claim 4 is amended in several particulars for purposes of clarity in accordance with current Office policy, to assist the examiner and to expedite compact prosecution of this application. The Applicant appreciates the Examiner's indication of allowability concerning claim 3.

#### **I. Election Restriction**

The Examiner argues in paper number 8, that the separate classification proves that a different field of search is warranted because the different field of search is proof of a serious burden.

The Examiner also stated that with regards to the arguments that claims 7-9 have features of group II and are dependent from claim 1 which includes features of group I, the Examiner does agree. However, the Examiner states that as indicated by the preambles and the included manufacturing steps, the claims are directed to a method of manufacturing a cathode and since the claims have been shown to be distinct and serious burden has been established by the separate classification and different field of search, in accordance with MPEP § 808.02 (A), the restriction is deemed proper. The Examiner argues that satisfaction of undue burden is satisfied according to MPEP §808.02(A) because of the separate classification and because the inventions are distinct.

However, respectfully, since features from group II depend on a claim with feature of group I, does show that there is no serious burden because both groups must be searched by the Examiner. The preamble does not change this because the overlapping fields of search within the different

groups cause no serious burden.

Moreover, claim 7 from group II, includes “A method of preparing the cathode for an electron tube of claim 1...” where claim 1 is from claim 7. According to MPEP §809, “The linking claims must be examined with the invention elected, and should any linking claim be allowed, the restriction requirement must be withdrawn.” (emphasis added). The Examiner has improperly failed to examine claim 7 for example and therefore also claims 8 and 9.

## II. CLAIM REJECTIONS - 35 U.S.C. § 102

Claims 1-2 and 4-6 are rejected under 35 U.S.C. 102(e) as being anticipated by Yamauchi et al. (US 6,351,061). The Applicant respectfully traverses.

No claim is anticipated under 35 U.S.C. §102 (b) unless all of the elements are found in exactly the same situation and united in the same way in a single prior art reference. As mentioned in the **MPEP §2131**, “a claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Every element must be literally present, arranged as in the claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913, 1920 (CAFC 1989). The identical invention must be shown in as complete detail as is contained in the patent claim. *Id.*, “All words in a claim must be considered

in judging the patentability of that claim against the prior art.” *In re Wilson*, 424 F.2d 1382, 165 USPQ 494, 496 (CCPA 1970), and MPEP 2143.03.

Regarding claims 1-2, the Examiner in paper no. 8 stated that the Yamauchi reference specifically states that the range of the rough layer is 15 or less and more preferably 10 or less microns. The Examiner agrees that no specific examples falling within the claimed ranges are disclosed in Yamauchi, and that a case by case determination must be made as to anticipation according to MPEP § 2131.03, however, the Examiner states that although the specification of the current application teaches that the range be 8 or less and more preferably 5 or less microns, it does not provide evidence of any unexpected results within the claimed narrower range. Accordingly, the Examiner states that because the narrower ranges are considered to be disclosed with "sufficient specificity", the claimed ranges are anticipated by Yamauchi.

However, respectfully, the present invention on the record does disclose the significance of a surface roughness of 8 or less and more preferably 5 or less microns.

In paragraph 34 of the present invention, it states, “an oxide cathode layer according to the present invention has a roughness of no greater than 8  $\mu\text{m}$  (micrometers or microns) and preferably no greater than 5  $\mu\text{m}$ , thereby having a uniform and compact surface.” Therefore, such a range gives a uniform and compact surface.

In the subsequent paragraph 35, the present invention refers to the structure with the certain

range of roughness by stating:

A cathode for an electron tube having such a structure has compactness 2-3 times better and surface roughness about 4 times better than a conventional cathode. Accordingly, the present invention provides a cathode with a high density and evenness. Consequently, the thickness of an electron emissive material layer can be greatly decreased, the shrinking of a cathode due to a long operation can be prevented, thereby improving a life characteristic and degradation of brightness, and defects caused by a difference between a voltage applied to a cathode and a voltage applied to a G1 (first grid) electrode can be prevented.

Paragraph 41 of the present invention specifically states:

Further, as seen in FIG. 8, surface roughness of the electron-emissive material layer 110, which is measured as the distance “d” between the highest point 110a and the lowest point 110b on the surface of the electron-emitting material layer 110, is controlled to be no greater than 8  $\mu\text{m}$  (micrometers), or preferably no greater than 5  $\mu\text{m}$ , a variation in the voltage due to a difference in the distance between the cathode and the first grid, is minimized, and shrinkage of the cathode due to a long operating time of the cathode can be reduced. (emphasis added)

Paragraph 56 of the present invention goes on to state, “Moreover, the profile of an electron beam emitted from a cathode material having a relatively lower roughness has the shape of a

spherical wave, which increases a beam spot, thereby eliminating a moire phenomenon due to the roughness of a cathode.”

Therefore, clearly the present invention discloses a significance to the range of roughness, thereby overcoming an anticipation rejection of an overlapping range because the reference lacks disclosure of the claimed ranges with sufficient specificity.

Furthermore, as explained in paragraph 8 of the present application, the spray method causes greater coarseness. As mentioned in the abstract of Yamauchi, Yamauchi uses a spraying method which can result in a roughness of up to 10 or 15 microns while the present invention is able to control the roughness to be 8 or less and even 5 or less.

Concerning claim 4, the amended claim 4 not anticipated by Yamauchi. The Amendment to claim 4 is supported by the specification, paragraph 33, “As the density of an electron emissive layer increases, carbonate tends to come off. However, in the present invention, when the thickness T of an electron emissive layer 110 is less than about 70  $\mu$ m (micrometers or microns), this problem does not occur.” (emphasis added) Therefore, the electron emissive layer should be less than 70 microns as seen in the amended claim 4 which is amended for clarification purposes.

Therefore, since Yamauchi discloses an electron emissive layer of 70 microns, claim 4 of the present invention is not anticipated.

Entry of the foregoing amendments to claim 4 is proper under 37 C.F.R. 1.116(b) because those amendments simply respond to the issues raised in the final rejection, no new issues are raised, no further search is required, and the foregoing amendments are believed to remove the basis of the outstanding rejections and to place all claims in condition for allowance. Furthermore, the amendment to claim 4 merely corresponds to the specification.

The process steps in claims 5 and 6 should be given patentable weight since the process steps imply a structure according to MPEP 2113.

The Examiner in paper no. 8 disagreed because, "The MPEP lists process terms and simply states that such terms "are capable of construction as structural limitations." The Examiner stated that it is the position of the Examiner that the claimed product can be defined by process steps other than process steps claimed, including the process steps taught by Yamauchi.

Respectfully, the fact that claimed product can be defined by process steps other than process steps claimed have nothing to do with the standard set in MPEP 2113 where structure implied by the process steps must be considered.

The Examiner goes to state that claimed manufacturing process steps are not found to impart structural characteristics to the final product different than the final product as disclosed by Yamauchi. The Examiner does agree that certain process steps may lead to a differently structured

final product and in which case are considered patentable. However, the Examiner states that the Applicant has not provided teachings to suggest that such a differently structured product, as compared with the product disclosed by Yamauchi, is produced.”

Respectfully, however, as seen in the abstract of Yamauchi, the electron emitting material is sprayed on, which results in the greater roughness of up to 10 to 15 microns. Unlike the spraying of the electron emitting materials, the present invention, on the other hand, for example in claim 6, uses a screen printing method that is able to control the roughness to less than or equal to 8 microns.

The Examiner states that MPEP 2113 states, "The structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product. See, e.g., *In re Garnero*, 412 F.2d 276, 279, 162 USPQ 221, 223 (CCPA 1979) (holding "interbonded by interfusion" to limit structure of the claimed composite and noting that terms such as "welded," "intermixed," "ground in place," "press fitted," and "etched" are capable of construction as structural limitations.)".

However, the method of attaching the electron emissive layer on to the base metal does in fact impart structural characteristics.

As explained in paragraph 8 of the present application:

However, since a spraying method uses only force sprayed by air pressure without using any other pressure, it is limited in obtaining a uniform and dense coating film. More specifically, the structure of an electron emissive material layer

attached by a spraying method is shown in FIGS. 2 and 3. FIG. 2 is an electron microscopy photograph of the section, which is enlarged 200 times, of an electron emissive material layer attached by a spraying method. As shown in FIG. 2, the size of the pore between particles is nonuniform, the surface is very coarse, and the texture is sparse. FIG. 3 is an electron microscopy photograph of the surface texture, which is enlarged 2000 times, of the electron emissive material layer of FIG. 2. It can be confirmed again that the size of the pore between particles is nonuniform.

The electron microscopy photographs show the structural flaws created in the related art that uses the spraying method such as Yamauchi which also uses the spraying method. For one thing, a greater roughness is generated as Yamauchi cannot control the maximum roughness to less than 10 microns and the spraying method also exhibits less uniformity and a sparse texture. Therefore, the process steps of claims 5 and 6 should be given patentable weight and therefore since Yamauchi discloses a spraying method, claims 5 and 6 are not anticipated.

In view of the foregoing amendments and remarks, all claims are deemed to be allowable and this application is believed to be in condition to be passed to issue. If there are any questions, the examiner is asked to contact the applicant's attorney.



No fee is incurred by this Amendment. Should there be a deficiency in payment, or should fees be incurred, the Commissioner is authorized to charge Deposit Account No. 02-4943 of Applicant's undersigned attorney in the amount of such fees.

Respectfully submitted,



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